An Appraisal of the Advertising Analysis and Conclusions in the "Health or Tobacco" report from the Toxic Substances Board of New Zealand

A report prepared by
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Section 1: Introduction

An analysis of Chapters 6, 7 and 8 of the Toxic Substances Board (TSB) report was commissioned by the Tobacco Institute of New Zealand on June 16th for delivery on July 7th.

In order to critically appraise the TSB report a substantial quantity of data had to collected from many different sources. Infotab played a key and enormously helpful role with this data collection. Nevertheless a sufficiently comprehensive data set was not acquired until July 3rd, leaving 5 days for the computer analysis, report finalisation, writing, and production.

This time scale was obviously too short to produce a fully comprehensive analysis of the TSB report. Nevertheless we believe that the enclosed analysis does adequately review the more controversial points which are made in Chapters 6, 7 and 8.

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Section 2 Summary and Conclusions

The TSB report is an extensive document. Although substantial, and visually very well presented, the report contains a great many errors and misconceptions, and much invalid data and analysis.

There are six main areas of criticism.

First, the authors of the report have made some fundamental assumptions about how advertising works. These assumptions are almost all demonstrably wrong. The TSB report betrays a total lack of understanding of how consumer markets operate, and the role of advertising within these markets. Furthermore the TSB report has advanced no serious evidence in support of its case and has failed to take into account or consider in any way the large body of evidence now available from independent sources which contradicts the views advanced by the TSB. This flaw in the report is very serious, and in the opinion of the authors of this appraisal, is sufficient to invalidate many of the reports findings.

Second, the report uses a lot of market size and structure data derived from surveys to justify the conclusions reached. Market survey data covering tobacco consumption is always prone to very considerable error. This is a matter of fact not opinion. The large error to which the data is subject invalidates all conclusions drawn from this source.

Third, the report also uses the much more reliable tobacco consumption data derived from national statistics, taxation authorities and other such sources. Unfortunately these data are used in a selective and partial manner. For example, the methodology used in general is to compare trends after an advertising ban with trends in other countries where a ban has not taken place. No account has been taken of the trends in the ban countries before the ban took place, which is of course crucial information. The TSB's manner of usage of tobacco consumption data thus undermines the conclusions they have drawn.

Fourth, even accepting the TSB's methodology and consumption data, the conclusions the TSB has drawn from its analysis are still not valid. The reason is that the [redacted] data from Portugal. Further analysis has revealed that the data used for Portugal is volatile and, in addition, if the later data presented in the TSB report is incorporated into their analysis, the reason for the TSB's superficial conclusion largely disappears. A reworking of the TSB data, using a more rigorous statistical approach, demonstrates no impact of increasing advertising restrictions on tobacco consumption.

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Fifth, the report bases many of its judgements on a small scale literature review which leaves out of consideration many of the most important papers in this area of knowledge. Many individual papers, and much more crucially, most independent reviews of the evidence, (covering in total many more analyses than the 14 studies examined by the TSB), have arrived at conclusions diametrically opposed to those drawn by the TSB authors. In addition to the lack of coverage of the TSB review, the conclusions the TSB draw from their review of the literature is heavily dependent on five studies all of which have been the subject of serious criticism, and one as yet unpublished (and hence not yet the subject of any critical appraisal) study. The TSB literature review cannot as a consequence be taken as a serious objective appraisal of the evidence.

Sixth, the report contains a large number of what can only be called mistakes of various types, ranging from the evident lack of appreciation of simple statistical practices, to the inclusion in the report of contradictory statements. In several important analyses the use of totally inappropriate statistical techniques leads the TSB to draw conclusions that are the precise reverse of what is demonstrably true.

To conclude, the TSB report is an ambitious attempt at producing a definitive answer to the question of what impact tobacco advertising has on tobacco consumption. Unfortunately [redacted] Individually these various criticisms invalidate large sections of the TSB report. Collectively they mean that none of the report's conclusions can be regarded as a reasonable basis for public policy decision making.

[redacted]

(1) [redacted]

(2) [redacted]

These conclusions are broadly in line with the answers reached by independent Government agencies, academics and researchers who have reviewed the evidence relating to the impact of advertising on markets in general, and on the tobacco market in particular.

As regards the situation in New Zealand, tobacco consumption has already fallen faster than in any country that has instituted a tobacco advertising ban - for whatever reason - since 1975, the date of the much vaunted Norwegian tobacco advertising ban. This analysis of the TSB report demonstrates that further restrictions on tobacco advertising in New Zealand would have no measurable impact on tobacco consumption.

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Section 3: The Approach Adopted

The Toxic Substances Board report is an extensive document containing many observations, statistics and analyses. The main conclusions regarding advertising have been drawn from three quite different sources.

First, conclusions have been drawn from a set of beliefs and assertions regarding how advertising works; second from various literature searches; and third, from a study of advertising policies and tobacco consumption trends in 33 countries.

In appraising the report we first looked at the entire document. We have identified certain deficiencies in methodology, some errors and omissions, and a variety of other problems that we believe exist and which detract from the report's usefulness.

We conducted an international literature search in order to bring together data and evidence from all sources available at the time of writing, including a number of key sources not utilised by the TSB authors. This evidence, combined with evidence deriving from the previous stage of research allowed conclusions to be drawn regarding the incomplete nature of the information and analyses used in the TSB report.

We then undertook a rigorous examination of the data presented in the TSB report.

Finally, we have attempted to produce an overall review of the validity of the TSB evidence in the light of identified error, our own re-analysis of TSB data, and our worldwide literature searches.

Section 4: A Review of Chapters 6, 7 and 8 of the TSB Report

The chapters of the TSB report that deal with advertising suffer from six basic flaws.

First, the report makes many fundamental assumptions about how advertising works, which are demonstrably quite wrong.

Second, the report uses a great deal of data which can be shown to be highly misleading. Many of the reports conclusions are thereby invalidated.

Third, although the report also uses a great deal of data which is valid, the authors of the report appear to have used these data in a selective and partial manner, thereby invalidating much of the useful work done.

Fourth, even when using the correct data, the TSB authors use methods that place great reliance on data from Portugal. These data are volatile. Inclusion of more recent data (available in the TSB report) changes completely the conclusions that can be drawn from the analysis.

Fifth, the report draws conclusions on the basis of a small literature survey. Unfortunately, useful though the survey is, many key articles, and in particular reviews of the relevant literature, have been ignored. This has led to a great deal of confusion and error.

Sixth, the report contains many small errors, methodological faults and factual mistakes. Individually few of these transgressions are of consequence. Collectively they invalidate many of the conclusions drawn.

This section of our report deals with each of these areas of criticism in turn.

4.1 Fundamental Assumptions Made by the TSB Report

The TSB report contains many statements that reflect the fundamental assumptions made by the authors about how advertising works. For example:

> *"the reason that [redacted] advertise [redacted] (emphasis added) to expand market size"*

> *"In the United States in 1987 manufacturers spent 1.66 billion dollars on advertising tobacco. It is [redacted] (emphasis added) that promotion on this scale has no effect on total sales."*

"Commonsense (and empirical evidence) would also argue that when soap manufacturers promote many different brands of soap, they also promote overall soap sales - and cleanliness. A corollary, then, suggests that when tobacco manufacturers advertise and promote many brands of tobacco for smoking, overall tobacco sales are also promoted."

"Tobacco advertising expenditure can be economically justified by generating extra sales, either from

(1) current smokers switching to the advertised brand, or

(2) ex-smokers taking up smoking again, or

(3) current smokers being persuaded to smoke more cigarettes, or

(4) more new young smokers being persuaded to start than would have otherwise.

Detailed calculations show that tobacco manufacturers are now probably spending in excess of ten times more per year on advertising than they are likely to gain in the same time by brandswitching. Brandswitching, the industry's justification for advertising, accounts for only 7 percent of the economic return from maintaining tobacco advertising and sponsorship. This is the best estimate of the situation in the light of information that is currently available in the public domain. The conclusion is that over 90 percent of the tobacco advertising expenditure can only be recouped if tobacco advertising increases the number who smoke, particularly by attracting new smokers to smoking."

These statements are intuitively appealing. However, they reflect a view of advertising which is demonstrably a long way from the hard reality known to the thousands of marketing executives who use advertising as a day-to-day tool of their trade.

Explaining to non-marketing people the exigencies of 'life at the coalface' in a competitive consumer market is a difficult and lengthy business. Appendix 1 *'The Role of Advertising'* attempts to explain why advertising is used, and what it can and cannot do. Although such an explanation of the marketing process is necessary to place fully in context the erroneous nature of the TSB assumptions, it is not necessary in order to demonstrate that the TSB's statements are wrong.

The first part to note in this context is that the TSB advances very little evidence in support of its highly tendentious claims. No evidence is put forward to support the massively broad claim that the reason monopolies advertise **must** be to expand market size, other than a table showing the large (but not complete) market share of monopolies in these countries. No reference is made to [redacted] No reference is made to the obvious

desire of monopolies to keep import sales down, or to announce to consumers new, perhaps higher margin, products. And so on.

No evidence is put forward to support the claim that the tobacco advertising expenditure in the USA **must** influence sales in total. Only one ancient and much criticised study is put forward to support the argument that soap advertising promotes soap sales. No evidence at all is given to support the assertion that "over 90% of tobacco advertising can only be recouped if advertising increases the number who smoke."

There is however a great deal of evidence (nowhere mentioned in the TSB report) to support the view that advertising expenditure is unlikely to influence the total size of large mature markets or indeed the economy as a whole.

A number of **reviews** of this large body of evidence have been conducted in recent years, by totally independent Government employees, researchers and academics.

For example, a recent Federal Trade Commission *Bureau of Consumer Protection* review of the available literature (including the Comanor & Wilson's study quoted by the TSB) relating to the subject:

> *"A number of studies use statistical techniques and real world data to test for the effect of advertising on total consumption in each of many industries over a period of a decade or longer. These studies generally estimate the effect of advertising on consumption while using statistical techniques to hold constant the effects of variables such as industry price and consumer income. Because price is held constant, the results of these studies can be interpreted as estimates of the effect of advertising on consumer demand for an industry's product.*
>
> *"We reviewed the most important of these studies as well as other reports that survey this literature. [redacted] (emphasis added).*
>
> *"The principal exception of this generalization is a controversial study by Comanor & Wilson, for which the principal results cover 28 industries during 1948-64. Comanor & Wilson found that advertising had a significant positive effect on industry demand in 10 industries. **This study and its results have been widely criticised** (emphasis added). One problem is the use of IRS data for advertising expenditures. Grabowski (1976) used different advertising data and found no impact of advertising on total demand."*

There is also a great deal of evidence deriving from the impact of advertising in industry sectors comparable in terms of economic maturity with the tobacco industry. Here again the evidence conflicts totally with the TSB position.

For example, a very recent and extremely comprehensive review of the literature relating to the impact of advertising in the alcohol market by a researcher from the Addiction Research Foundation in Toronto found that:

> *"The evidence indicates that advertising bans do not reduce alcohol sales, total advertising expenditures have no reliable correlation with sales of alcoholic beverages, **and that experimental studies typically show no effect of advertising on actual consumption**" (emphasis added).*

Further reviews of the evidence is this area are given in the Appendices to this report. It is clear that the use of only the Comanor & Wilson work as "evidence" constitutes a serious flaw in the report and leads to conclusions being drawn which are the reverse of those drawn by larger and more adequate reviews of the evidence.

It is also clear that the use of language such as 'must be' and 'inconceivable' is inappropriate in a supposedly serious appraisal of this subject. Opinion, no matter how firmly held, does not constitute evidence.

The claim that over 90% of advertising money is necessarily devoted to total market expansion rather than brand competition is perhaps the most extraordinary statement made in the whole report. It is very difficult to take seriously such a claim.

To reject such a claim it is only necessary to look at the endlessly shifting brand share and advertising expenditure patterns in almost all markets (many of which are static or declining) to see that if the TSB statement were true a very large proportion of advertising expenditure would be totally wasted. It is simply a fact that the vast majority of advertising is aimed directly at increasing the sales of individual brands, without any reference to the total market in which the brands operate. It is a fact that the entry of a new brand - such as the new brands of Australian lager beer that were introduced into the UK some years ago - can play havoc with existing brand shares. The Australian lager brands now take a very large share of the total UK beer market. Using competitive brand advertising combined with other factors, the Australian brewers have carved out a market worth many hundreds of millions of pounds a year, in a market in overall decline. The companies involved have gained massively from their endeavours. Yet they have neither tried to, or succeeded in, expanding the UK beer market.

To summarise, the TSB report betrays a total lack of understanding of how consumer markets operate, and the role of advertising within these markets. Furthermore the TSB report has advanced no serious evidence in support of its case and has failed to take into account or consider in any way the large body of evidence now available from totally independent sources which contradicts the views advanced by the TSB.

This flaw in the report is very serious and alone, in the opinion of the authors of this appraisal, is sufficient to invalidate many of the reports findings.

4.2 Misleading Data Used in the TSB Report

In the report 'Health or Tobacco' the TSB makes extensive use of survey data which purports to describe tobacco consumption.

For example in Table 8.3.3 of the TSB report, actual consumption data is given which describes the fact the tobacco consumption per adult has fallen faster in New Zealand (-1.9%p.a.) over the period 1976-86 than it has in Norway (-0.8%p.a.) or Finland (-0.8%p.a.). Further data is then given showing that 'Daily Smoking in Youth' and 'Daily Smoking in Adults' has in Norway fallen far faster (-3.2% and -2.5% respectively) than in New Zealand (-0.3% and -1.7%). There is obviously an inherent contradiction in these two sets of data.

If daily smoking by youth and adults has apparently fallen far faster in Norway than in New Zealand, yet total consumption has actually fallen far faster in New Zealand than in Norway, it would indicate that one or other data set is wrong.

The fact is that TSB survey data covering tobacco consumption is highly suspect. It is a simple matter of fact (and therefore not a matter of opinion) that survey methods (asking people about how much they smoke) provide very different results to the alternative methods (favoured by Trade Associations, taxation authorities and others who need to know the facts with precision) which involve observing actual behaviour as documented in official statistics.

It is a fact that survey data does not and cannot gross up to national consumer levels described (for example) by government statistics compiled for taxation purposes. The reason is simple. People tend to underestate their consumption in response to questions about their smoking habits (and drinking habits) to a far greater extent than is the case with market survey data in other less emotive areas.

Survey evidence usually manages to document between 30% and 70% of total national consumption levels for such products thereby rendering useless any attempt at drawing conclusions such as those formed in tables 7.5.1a and 7.5.1b of the TSB report.

The fact is that tobacco consumption has fallen far faster in New Zealand than in Norway over the period since advertising was banned in Norway. Had smoking behaviour amongst Norwegian youth really radically changed following the advertising ban (now fourteen years ago) the effects would be clearly visible in the national statistics. They are not.

The TSB report relies in very large measures on such totally inadequate survey data. A great deal of the 'evidence' presented in chapters 6, 7 and 8 is therefore totally invalidated as serious evidence.

4.3 The Selective and Partial use of National Tobacco Consumption Data

The authors of the TSB report have used real tobacco consumption data in the report in addition to the survey data described in section 4.2 above. They often (improperly) reject the evidence of this data in favour of conclusions drawn from inaccurate survey data, but nevertheless they have accumulated an interesting body of real consumption data.

Unfortunately the authors of the report have not accumulated enough data to serve correctly their purpose.

The methodology used in general is to compare trends after a ban with trends in other countries where a ban has not taken place. No account has been taken of the trends in the ban countries before the ban took place, which is of course crucial information. One cannot interpret a claimed difference between groups of countries after a ban in one group, unless one can demonstrate the difference was not evident before the ban.

The importance of seeing the 'whole picture' is illustrated by the table attached (table 4.1) which shows per capita consumption for all OECD countries. As can be seen from the table (which also assembles hard consumption data for each country from all known sources) on any measure or data source used, those countries which have achieved the greatest falls in tobacco consumption allow tobacco advertising. (These data are also given by data source in Appendix 2).

New Zealand has achieved a greater fall in tobacco consumption than any of the countries which have had advertising bans in place, in some cases for many years.

To summarise the use of data runs covering only post-ban situations is a major flaw in the TSB report. This omission invalidates several key TSB conclusions.

4.4 Overdependence on Volatile Consumption Data for One Country

In addition to this misuse of data, the TSB report omits certain very important figures which are easily available but whose omission greatly affects the overall conclusions. For example, one of the key conclusions of the report, based on national consumption data, relies wholly on data from Portugal for the years 1983-1986. Adding to the report data for 1987 radically alters the conclusions that would have been drawn. The short data run used and the omission of recent but available data is a key error in the report which invalidates one of its major findings. (More information on this key point is contained in Section 5).

Table 4.1 Per Capita Tobacco Consumption Trends in OECD Countries With and Without a Tobacco Advertising Ban.

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	% Change from 1975
1	Netherlands	3060	2770	3060	2430	3010	2730	2050	2020	2160	1560	1690			-44 77
10	UK	3286	3191	3009	2906	2862	2716	2411	2170	2064	2028	1950	1885	1827	-44 42
8	Netherlands	1748	1635	1940	1683	1908	1586	1501	1476	1372	1146	1074	1048	1031	-41 05
10	Netherlands	1748	1635	1940	1683	1908	1624	1487	1546	1358	1160	1074	1092	1041	-40 45
2	Netherlands	1749	1634	1941	1693	1895	1555	1495	1488	1531	1186	1083			-38 05
10	Belgium/Lux	2031	1987	1950	1761	1892	1913	1935	2088	1723	1538	1611	1386	1280	-36 99
1	UK	3210	2970	2950	3020	2840	2750	2470	2270	2180	2180	2120			-33 96
11	Ireland				2331	2257	2211	2119	1952	1865	1806	1759	1663	1589	-31 84
2	Ireland	2366	2319	2218	2293	2286	2205	2091	1925	1854	1785		1638	1581	-31 06
2	Belgium/Lux	2501	2448	2504	2423	2588	2595	2633		2143	2015	1897	1818	1768	-29 33
2	UK	2359	2324	2241	2229	2211	2158	1956	1811	1802	1761	1743	1682	1669	-29 26
4	UK	2600	2500	2400	2600	2500	2500	2100	2100	2100	2100	2000	2000	1900	-26 92
1	Ireland	3490	3240	3110	2940	2910	2890	2750	2870	2870	2630	2560			-26 65
22	Canada	2563	2605	2641	2616	2666	2679	2729	2692	2531	2456	2330	2189	2043	-20 28
10	Canada	2586	2686	2708	2661	2727	2680	2729	2743	2578	2462	2343	2178	2072	-19 85
27	New Zealand	2018	2000	2028	2003	1954	1906	1954	1920	1887	1914	1724	1593	1620	-19 72
9	Iceland	1402	1399	1268	1258	1275	1256	1288	1261	1274	1269	1192	1146	1132	-19 23 α
2	Canada	2512	2636	2653	2660	2688	2680	2729	2695	2532	2468	2339	2183	2051	-18 38
1	Belgium - Lux		2380	2260	1990	2130	2230	2080	2390	2140	1910	1990			-16 39
6	USA	2811	2814	2802	2767	2762	2773	2781	2727	2555	2533	2482	2416	2353	-16 30
10	USA				2759	2727	2725	2773	2641	2545	2523	2486	2413	2366	-14 27
25	Belgium - Lux	2031	1987	1949	1761	1892	1913	1935	2134	2080	2041	1918	1852	1745	-14 12
21	Australia	2301	2213	2280	2290	2352	2382	2310	2135	2089	2112	2199	2129	2042	-11 26
1	Sweden	1860	2030	1770	1790	1920	1950	1770	1790	1780	1790	1660			-10 75
28	Norway	2100	2050	1995	2012	1995	2044	1980	1942	1834	1836	1841	1889	1876	-10 67 α
1	Germany FR	2660	2650	2330	2500	2530	2610	2540	2200	2280	2350	2380			-10 53
10	Finland	1719		1388	1391	1360	1356	1384	1717	1466	1536	1469	1468	1559	-9 32 α
23	Finland	1714	1351	1389	1391	1456	1476	1378	1430	1466	1537	1387	1465	1555	-9 28 α
2	Finland	1719	1354	1393	1389	1448	1485	1375	1429	1462	1536	1387	1464	1561	-9 18 α
1	Finland	1880	1540	1640		1890	1840	1870	1780	1820	1910	1720			-8 51 α
10	Japan	2633	2435	2669	1749	2684	2661	2604	2640	2606	2594	2560	2541	2415	-8 25
2	Sweden	1428	1459	1382	1414	1411	1432	1382	1453	1393	1379	1341	1338	1322	-7 47
1	Norway	760	730	770	730	810	850	700	700	540	580	710			6 58 α
2	Iceland							1926	1778	1844	1863	1805	1770	1800	-6 56 α
5	Norway	1581	1519	1573	1487	1566	1629	1553	1413	1434	1451	1515	1534	1504	-4 90 α
1	Denmark	2210	2320	2270	2240	2080	1970	2070	2030	2050	2100	2110			-4 52
2	Germany FR	2004	2080	1888	1984	2014	2063	2104	1760	1851	1924	1952	1922	1923	-4 03

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Table 4.1 Per Capita Tobacco Consumption Trends In OECD Countries With and Without a Tobacco Advertising Ban.

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	% Change from 1975
1	Portugal	1800	1660	1750	1760	1840	1780	1800	1800	1870	1730	1730			-3 89 α
20	Denmark	1707	1779	1766	1750	1633	1590	1567	1714	1646	1745	1741	1701	1647	-3 52
18	Germany FR	1997	2080	1863	1979	2028	2084	2092	1815	1930	1951	1973	1924	1930	-3 34
1	Switzerland		3050	3300	3170	3620	3680	2710	3190	3120	2880	2960			-2 95
10	Australia		2127	2354	2298	2274	2232	2298	2252	2234	2208	2070	1992	2066	-2 86
2	Switzerland	2420	2416	2517	2432	2362			2474	2515	2490	2418	2404	2402	-0 75
10	Germany FR	2041	2098	1891	2011	2054	2085	2112	1855	1917	2005	2021	1994	2028	-0 65
2	Denmark	1403	1478	1454	1430	1446	1405	1386	1524	1427	1506	1525	1465	1404	0 02
10	Sweden	1425	1458	1376	1417	1441	1431	1380	1449	1447	1462	1356	1418	1430	0 38
1	Iceland	3020	2820	2850	3130	3220	3240	3240	3200	3160	3130	3100			2 65 α
10	Switzerland	2419	2419	2518	2431	2368	2409	2440	2473	2548	2520	2521	2414	2499	3 32
29	France	1609	1582	1626	1591	1640	1628	1608	1615	1635	1660	1746	1708	1693	5 24
2	Portugal				1373	1339	1324	1378	1442	1473	1451	1441	1451		5 71 α
13	Turkey	1294	1344	1372	1176	1102	1144	1434	1330	1284	1296	1276	1280	1375	6 26
10	Italy	1601	1611	1620	1583	1720	1749	1787	1879	1908	1861	1978	1839	1716	7 18 α
12	Portugal	1350	1285	1350	1340	1304	1291	1347	1378	1435	1410	1409	1420	1449	7 39 α
10	Ireland		1642	1620	1647	1996	2205	2105	1925	2012	1852	1808	1771		7 84
2	Italy	1600	1610	1620	1582	1720	1750	1786	1794	1799	1830	1843	1774	1727	7 93 α
26	Italy	3202	3222	3240	3165	3440	3499	3573	4110	3596	3660	3687	3660	3459	8 05 α
10	Austria	1845	1905	1943	2000	2076	2055	2078	2053	2142	2046	2141	2048	1995	8 15
10	France	1560	1536	1579	1545	1599	1590	1582	1585	1636	1659	1744	1708	1694	8 58
2	France	1558	1535	1577	1546	1640	1568	1576	1586	1606	1632	1717	1686	1692	8 58
2	Austria	1847	1903	1942	1997	2080	2053	2075	2047	2052	2065	2064	2062	2007	8 63
1	Austria	2350	2500	2600	2670	2700	2670	2550	2680	2650	2510	2560			8 94
19	Austria	1844	1905	1943	2000	2076	2055	2078	2053	2102	2059	2070	2064	2011	9 06
1	France	2170	2150	2060	2130	2170	2080	2050	2050	2070	2090	2400			10 60
10	Portugal	1380	1316	1376	1467	1348	1339	1381	1412	1492	1434	1431	1406	1531	10 95 α
1	Italy	2120	2180	2170	2090	2250	2320	2180	2390	2410	2370	2460			16 04 α
1	Greece	3130	3250	3350	3480	3470	3420	3590	3370	3340	3500	3640			16 29
10	Spain	1751	1920	1994	1884	2024	2046	1907	1844	1692	1973	2023	1987	2081	18 83
2	Spain	1643	1761	1837	1725	1896	1884	1701	1810	1864	1935	2052	2015		22 64
10	Denmark	1324	1400		1450	1427	1374	1386	1524	1646	1730	1725	1668	1628	22 96
15	Spain	1669	1783	1861	1742	1914	1899	1734	1822	1875	1944	2064	2020	2067	23 83
10	Greece	2380	2485	2255	2660	2636	2641	2724	2623	2621	2766	2826	2900	2952	24 01
14	Greece	2373	2486	2556	2645	2609	2309	2413	2624	2702	2847	2911	3009	2959	24 72
1	Spain	2110	1600	1900	1800	2030	2320	2360	2460	2260	2620	2740			29 86
2	Greece	2089	2182	2245	2322	2294	2271	2415	2625	2701	2848	2909	3010	2961	41 70
10	Norway								425	426		567	627		47 59 α
17	Norway	438	427	484	456	501	546	487	425	428	471	555	630	655	49 52 α
2	Norway		422	495	468	491	538	488	437	436	459	554	624	645	52 83 α

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Sources for table 4.1

1 World Health Organisation Estimates (Consumption of Manufactured Cigarettes per Adult).
2 Maxwell Research Estimates (Cigarette Consumption per Capita)
3 International Agency Research on Cancer, Monographs Vol 38 Appendix 1 International tobacco sales (Consumption per Capita in pieces)
4 UK Smoking Statistics, N.Wald and S. Kirkluk. Dpt of Environmental and Preventive Mediciene, St Barthlomew's Hospital Medical College, London; S. Darby, Sir Richard Doll and M. Pike, Imperial Cancer Research Fund Cancer Epidemology and Clinical Trials Unit Oxford\TAC; R. Peto, Imperial Cancer Research Fund Cancer Studies Unit Oxford (Units grammes/person over 15)
5 Norwegian Customs and Excise, Consumption of Manufactured Cigarettes and RYO in Grammes per Capita
6 US Dept. of Agriculture Year Book, Consumption in Sticks per Capita.
8 Centraal Bureau voor de Statitiek. Cigarette Consumption Sticks per Capita.
9 Jonas Ragnarsson, Icelandic Cancer Society, Reykjavik, June 30th 1988, Units total cigarette Consumption Sticks per Capita
10 Tobacco Merchants of the US Inc. Special Reports Nos. SR88-2; SR87-2; SR 84-3 Cigarette Consumption Sticks per Capita.
11 Revenue Comisslonaires annual Report. Cigarette Consumption Sticks per Capita.
12 Tabaqueira. Cigarette Consumption Sticks per Capita.
13 TEKEL, Cigarette Consumption per Sticks Capita.
14 Series Historicas de Consumo de Tabaco Elaborado (1957-88), Cigarette Consumption Sticks per Capita.
15 Greek Ministry of Finance, Cigarette Consumption Sticks per Capita
16 Singapore Department of Statistics, Ministry of Trade and Finance, Cigarette Consumption Sticks per Capita
17 Norwegian Tobacco Manufacturers Association, OECD Population Estimates; Sales Sticks Per Capita (Includes border trade with Swedon from 1982).
18 Statistiche Bundestamt Wiesbaden, Finanzen und Sterun, Reihe 9.1.2. Tabakgewerbe, 1987, Cigarette Consumption Sticks per Capita
19 Austria Tabak, Cigarette Consumption Sticks per Capita.
20 Tobaksindutreln, Cigarette Consumption Sticks per Capita.
21 Australian Tobacco Board Annual Report, Cigarette Consumption Sticks per Capita.
22 Canadian Tabacco Manufacturers' Council, Cigarette Consumption Sticks per Capita.
23 Finnish Tobacco Manufacturers' Association, Cigarette Consumption Sticks per Capita.
24 Tobacco Institute of Hong Kong Ltd, Estimate Cigarette Consumption Sticks per Capita.
25 Belgische en Luxemburges fiskale bandjes, aangekocht voor in Belgie en in Luxembourg Units Cigarette Consumption Sticks per Capita
26 Officio Studi Federazione Italiana Tabaccai, Units Cigarette Consumption Sticks per Capita.
27 New Zealand Customs Department, Consumption of Cigarettes Sticks per Capita.
28 Norwegian Customs & Excise Directorate, per Capita Consumption of Cigarettles and Smoking Tobacco in Grammes per Capita Over 15. (Figures cover financial years not calender years).
29 SEITA Cigarette Consumption Units per Capita.

Note:
1. Countries ranked by % change since 1975.
2. Where incomplete data exists % change figures relate to available period
3. All data in the last column is derived from the data shown in the table.
4. All population data is from OECD Historical Statistics 1960-1987, unless otherwise stated. These data cover total population, not adult population as in the WHO estimates.
5. Where consumption data was given in units of mass, the conversion 1 cigarette = 1 gramme was used to obtain consumption in pieces.
6. WHO data is defined as consumption of manufactured cigarettes per adult, as the population base is different from the OECD source differences can be expected.
7. IARC data, see source 3 above,is available from the master database but does not appear on this table due to its out of date and fragmentary nature.
8. α Country with a ban on tobacco advertising.
9. All figures are given in sticks consumed per capita unless otherwise stated.

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4.5 The TSB Literature Base on the Impact of Advertising on Tobacco Consumption

The authors of the TSB report have assembled a number of studies relating to the subject under discussion. Unfortunately they have failed to find a significant number of research reports which are of substantial importance.

Of most particular interest in this debate, which involves the assessment of highly technical literature, some of which is associated with 'sponsors', is the opinion of previous reviewers of the literature, particularly when they are clearly independent of outside interests.

The authors of the TSB report located 14 relevant studies, but no independent literature reviews are quoted. They concluded that eleven of the fourteen studies showed that advertising "significantly affected national cigarette sales."

The TSB selection of available studies is, unfortunately, most inadequate. It is inadequate in that it excludes some of the most important studies. It is inadequate in that is has failed to examine the several major literature reviews now available. It is inadequate in that it has failed to examine evidence from studies of similar industries (notably, alcohol, where a wealth of material is available).

Finally the TSB literature survey is inadequate because the conclusions reached are highly dependent on the results of five studies (Comanor & Wilson; McGuinness and Cowling, Radfar, Reuijl and Chetwynd) all of which have been the subject of serious criticism, and one (Meads) as yet unpublished study.

Econometric studies have been used in the tobacco advertising debate on a 'quantity' as opposed to a 'quality' basis. Reports have been frequently left much to be desired. It is therefore very disappointing to find that such a partial and incomplete selection of material has been made by TSB.

It is particularly disappointing that the TSB selection fails to reflect the conclusions reached by Government agencies in other countries where rigorous analysis of the subject has been recently undertaken.

For example, to quote the recent US FTC Bureau of Consumer Protection report:

> *"We have reviewed the empirical literature on cigarette advertising and consumption because the cigarette market provides an opportunity to study important issues that are not covered in detail in general and/or alcohol advertising literature, particularly the effects of an advertising ban and on anti-consumption ads and other forms of health information.*

> *"Most of the large number of studies of cigarette company advertising have found little or no effect of changes in total advertising on total consumption. This result is consistent with that for the multi-industry studies reviewed above (emphasis added).*
>
> *"For example, according to Hamilton's 1972 review of the literature from the period before the widespread dissemination of health risk information in 1953, early studies found little or no effect of advertising on total demand. **Virtually all recent studies reach the same conclusions**" (emphasis added).*

A further quote from another literature survey covering the same subject produced by UK academics provides more evidence of the incomplete and slanted nature of the TSB's conclusions:

> *"The causal relationship between advertising and aggregate demand is still a matter of considerable controversy, but the latest careful research using sophisticated estimation procedures does tend to suggest that any causal effect is rather weak. Thus it seems to remain unproven that advertising had led to any marked increase in aggregate demand in general, or in the demand for either tobacco or alcohol products...It must be recognised that advertising could well be the wrong target in seeking to curtail consumption of products such as cigarettes and alcohol...**It does appear that so far there is little convincing support for the argument that changes in total consumption of these products are caused by advertising**" (emphasis added).*

Further evidence omitted by TSB is given in the Appendix 3. It is clear, however, from these illustrations that the TSB conclusions from their modest literature review are diametrically opposed to conclusions reached recently by other independent, and perhaps more thorough appraisals.

4.6 Miscellaneous Errors, Methodological Faults and Other Mistakes in the TSB Report

The report is so full of errors, both large and small, that a full appraisal would take many weeks of work to fully analyse. The following list therefore contains only the more obvious errors found.

4.6.1 Inappropriate Comparisons

The TSB report frequently makes broad sweeping comparisons that might be appropriate in a really full analytical report but have no place in such a superficial analysis. For example, comparisons are made of countries which differ widely from each other in a whole range of national characteristics. Three of the four countries in the 'total ban on tobacco promotion for health reasons' convention used throughout the report are Scandinavian. All the countries in the 'advertising never permitted for

political reasons' category are East European. Four out of five countries in the 'tobacco promotion in all media' category are Mediterranean. It is obvious that there is no reason to assume that all things being equal the trends in these groups would have been the same.

In one comparison made of the growth of filter-tips market share, the inclusion of the (very different) East European countries totally alters the results of the analysis. The TSB report claims that "Advertising bans were,... , clearly associated with an increased rate of shift from plain to filter-tip cigarettes". This claim is made on the basis of Table 7.5.3 of the TSB report which gives the average increase in filter-tip's market share classified by one of five categories of advertising restriction.

It is doubtful whether even the simple examination the TSB have made of the table supports this conclusion, but in so far as it does, this is because of the large annual gain in filter's share of the market in the East European countries.

However there is one dominant and vitally important feature of the data which the TSB have ignored; the declining potential for filter market share gains as filter market share increases.

It is obvious that the higher the base of filter cigarette market share, the lower the potential left for further growth. Fifty percent growth in the market share is an achievable task when filter cigarettes account for a few percent of the market. It is clearly impossible for the filter share to grow by 50% when 97% of the market is already taken by such cigarettes.

It is very easy to make allowance (statistically) for this distortion. The methodology is shown in Appendix 4. Using this simple adjustment the following table provides the correct measure of how well each group of countries has performed in achieving filter cigarette market penetration.

Group	Performance Measure
Promoted in all media	5.74
Weak ban	4.81
Strong ban	4.36
Total ban - health	4.47
Total ban - political	2.78

The centre three groups are not statistically significantly different from each other, largely due to the small numbers of countries in some groups, but the 'Promoted in all media' and 'Total ban - political' are significantly different. **This finding is consistent with advertising increasing the rate at which smokers switch to filter cigarettes and is totally at variance with the statement in the TSB report.**

A further example of this kind if error is shown in Tables 7.5.1a and 7.5.1c.

The TSB conclusion derived from Table 7.5.1a is that adult smoking has fallen faster in groups of countries with advertising bans.

The entire argument derived from table 7.5.1a hangs on data from three countries with a tobacco advertising ban: Iceland, Finland and Norway. The TSB have used an arithmetic average of the annual percentage fall in adult smoking to derive a 'group average fall' of 3.7%. This figure is somewhat difficult to interpret from a public policy stance since it is derived from a 9.5% fall in Iceland, a 0.5% fall in Finland and a 1.1% fall in Norway.

The large fall in smoking in Iceland (population just over 200,000) distorts the true position. In Norway and Finland (combined population over 9 million) the fall in smoking averages less than 1%. The population weighted average is also under 1%. This average fall of under 1% compares unfavourably with the much larger fall in smoking (on either a population weighted or unweighted basis) shown in the countries that allow tobacco advertising, as quoted in the TSB report. The true conclusion to be drawn from this table is again the precise reverse of that drawn by the TSB.

Table 7.5.1c is similarly flawed. Again the TSB conclusion (that tobacco consumption per person has on average fallen faster in those countries where tobacco advertising is banned for health reasons than in countries where it is not), is dependent entirely on data from one country, in this case Portugal.

The TSB quotes an average fall in tobacco consumption of 1.6% for the four countries cited as having total tobacco promotion bans for health reasons. This is contrasted with a much smaller fall of 0.4% in countries where tobacco advertising is allowed. However, the 1.6% fall is derived largely from a large 5.1% fall attributed to Portugal between 1983 and 1986. In the other three of the four countries quoted as having a ban on advertising for health reasons (for a much longer period), the consumption fall averaged 0.46% (using the simple arithmetic average used by TSB). **The true and obvious conclusion therefore is that in three out of the four cases the advertising ban made no difference whatsoever. The entire TSB case in this paragraph rests on 4 years data from one small country, coupled with the highly questionable use of unweighted averages. In addition, as already noted adding one years data to the Portugal figures produces a remarkably different result.**

The abnormality of the Portugese data in 1986 is discussed in Section 5 of this document, which examines the TSB consumption analysis in considerable detail.

Yet another example of inappropriate comparison is shown in comparisons made from data relating to the percentage of adults who smoke. Leaving aside the lack of validity of these data (as already discussed) there are numerous problems in interpreting the data shown. For example, in relation to table 7.5.1a, the evidence in

this table of accelerated change in smoking prevalence attributable to the ban policies is very poor, and highly dependent upon one or two data points which are themselves suspect.

In the 'fully enforced ban' group, data has been used comparing the years 1978-86 for Finland, 1973-86 for Norway, but only for 1985-86 for Iceland (1 year) and in this one year a decline of 9.5% is noted. This in itself seems a highly suspect figure and there are no trend data to indicate how this drop fits in to previous patterns. Since Iceland introduced a total ban in 1972, 14 years before this one year chosen, it is unlikely that an immediate cause and effect relationship exists between the ban and this sudden apparent decrease in the percentage of adults smoking.

The data for Belgium is included in 'few media' group from 1980 and in the "most media" group for 1970-79. However, the figures quoted for the percentage of adults increased from 20.2% to 21.3% between 1970 and 1979 but from 41.5% to 32% from 1980-86. Clearly one, if not both of these sets of figures is inaccurate.

France, included in 'most media' and 'few media' for different periods, shows a greater decline in the 'most' period.

Italy is included under 'few media' for 1980-83, but the enforced ban placing Italy in this category did not come in until 1983.

There is only one country in the 'all media' group (Japan) for which data are available, and this is hardly sufficient for purposes of comparison.

If the suspect data for Iceland and Belgium are removed from the calculations, and the data for Italy placed in the correct category, the table is amended as follows:

	Group average (revised)	Report Average
Enforced ban	-0.6	-3.6
Few media	-2.0	-2.5
Most Media	-1.56	-1.2
All media	-1.2	-1.2

Once again the true conclusion to be drawn from the data is the precise reverse of the TSB conclusion.

4.6.2 Data Deficiences

The TSB report claims for itself great thoroughness. Yet there are numerous examples of omissions, errors and inconsistencies in even the basic data used. For example, the consumption measure is claimed to be reliable because:

> *"Consumption of all tobacco for smoking is measured," because "any kind of tobacco for smoking is a toxic substance from the point of view of this report, and total tobacco consumption for smoking, rather than just its manufactured cigarette component, has therefore been measured for each country, as data permitted."*

Nevertheless, in the next two paragraphs it also claims that:

> *"cigarettes were counted by numbers", "as cigarettes are sold by number not weight...This eliminates the effect of lower tobacco content and cigarette weights in recent decades..."*

As a result, it is not clear just how the consumption figures have been arrived at.

A further example of the deficiences of the data presented by the TSB report include the fact that the extent of an advertising ban has been calculated on a 10-point scale, and this has been described in some detail. However, the calculations for each country in the study are not shown, so it is impossible to verify.

The report also claims to "allow for supply factors" and "allow for distortions in recorded consumption" in various countries, but at no point explains how this has been done, or on what basis. Because of the issues which affect these two factors, it seems highly unlikely that sufficient evidence exists to undertake such an 'allowance', thus giving an air of quite spurious additional authenticity to this study.

Summary of Section 4

The many problems listed above are more than sufficient to invalidate the conclusions drawn by the authors. The TSB work is incomplete, and misleading in almost all respects.

Its central theme (that tobacco advertising has a pronounced impact on tobacco sales, and that therefore a ban on tobacco advertising would cut consumption), cannot be justified on the basis of the evidence and analysis presented in the report 'Health or Tobacco'.

Section 5: A Detailed Examination of the New Evidence Presented Concerning the Impact of Advertising Restrictions on Consumption.

5.1 The Background to the New Study Reported in 'Health or Tobacco'

The report contains details of a new study commissioned by the Tobacco Subcommittee of the TSB from the New Zealand Department of Health. The findings form the main substance of the case in favour of an advertising ban in New Zealand.

Little real information was provided about the depth of scrutiny undertaken in this 33 country analysis, and the choice of countries appears somewhat eclectic (OECD plus Singapore, but excluding for no particular reason, Hong Kong for which good data exists).

Much was claimed for the study and in Section 7.4 entitled 'Methodology of Department of Health's Study' it was stated that in an effort to avoid the deficiencies in previous studies this work broke new ground, inter alia allowing for price and income changes which the report regarded as being important influences, and using a more accurate consumption measure of total cigarette tobacco per adult.

These and other claims for this study have been discussed briefly in Section 4 of this document. After careful examination of the published report it must be concluded that there was no formal incorporation of the vital economic considerations in the analysis underpinning the results that were presented. The report relies on simply grouping countries by category of advertising restriction to arrive at its conclusions, and claims that this overcomes the problems caused by the varying economic conditions affecting cigarette consumption from country to country.

As the report states

'Grouping of countries by advertising restriction policy, and knowledge of the effects of incomes and tobacco prices on consumption, enable conclusions to be drawn about the effects of advertising policies. The overall conclusions of this study are robust and will not be upset by including or omitting one country.'

The analysis presented below will show there are reasons to believe both statements are incorrect, and that the conclusions of the TSB are at variance with the evidence on which they are claimed to be based.

5.2 A General Discussion of the Data and the Approach Adopted

The study attempts to establish the impact of advertising restrictions by examining the trends in cigarette consumption within 33 countries. The two key questions asked in the report are

'Are tobacco advertising bans accompanied by falls in consumption ?'

and

'Are tobacco bans worthwhile ?'

It is interesting that the first question talks about 'accompanied by' rather than causes, because the implication must be that there is a causative relationship if a ban is to be effective in reducing consumption and be 'worthwhile' in the language of the second question. This critique assumes that the report has actually attempted to establish a causal relationship.

In doing this the authors have firstly developed a measure of cigarette smoking which they claim to be 'reliable', and claims to allow for the various distortions in conventional measures. This is to be commended. Unfortunately, it is not possible fully to understand how they have arrived at their measure, and as has been pointed out in Section 4.5.2 of this document, there are apparent contradictions in their claimed methodology for dealing with weight and numbers of cigarettes. Without an explanation of their calculations it is not possible to establish the authenticity of their approach to consumption.

Notwithstanding these reservations we have accepted their figures for the purpose of examining their conclusions, and this work is presented in Section 5.5 later. The one exception to this is Portugal, which because of its central importance to their conclusions we have examined in detail and concluded that there was an aberration in the end year used for the post-ban period (see Section 5.3 later).

The calculation of the change in the measure of consumption can also be criticised on the grounds that a simple arithmetic percentage change figure is used instead of a proper compound (multiplicative) measure ie. the % change over a period is calculated and this is then simply divided by the number of years in the period. This procedure is used for all data. It is likely to produce markedly inaccurate results if the rate of growth or decline in the data is over about 5% per year. Some bias will have been introduced by this but given the nature of their analysis this will probably not have had a material effect. Again in our analysis we have deliberately used the

same data as reported, even with our reservations, because of our desire not to introduce any differences to the basic data in our re-analysis of the findings.

The overall approach taken by the Department of Health was to examine trends in consumption only after the bans in Iceland, Finland and Norway, but both before and after in the case of the Portugal ban in 1983. These were compared with trends over the 1970-86 period for most other countries. The exceptions were France, Belgium and Italy, where periods before and after a change in advertising restrictions were used.

There are obvious criticisms in comparing different periods, particularly because in the case of cigarette smoking there have been negative trends in recent years associated with health publicity, and it could be argued that the best way to assess the change resulting from a ban is to examine time periods before and after as stated previously. It is not clear why this was not performed.

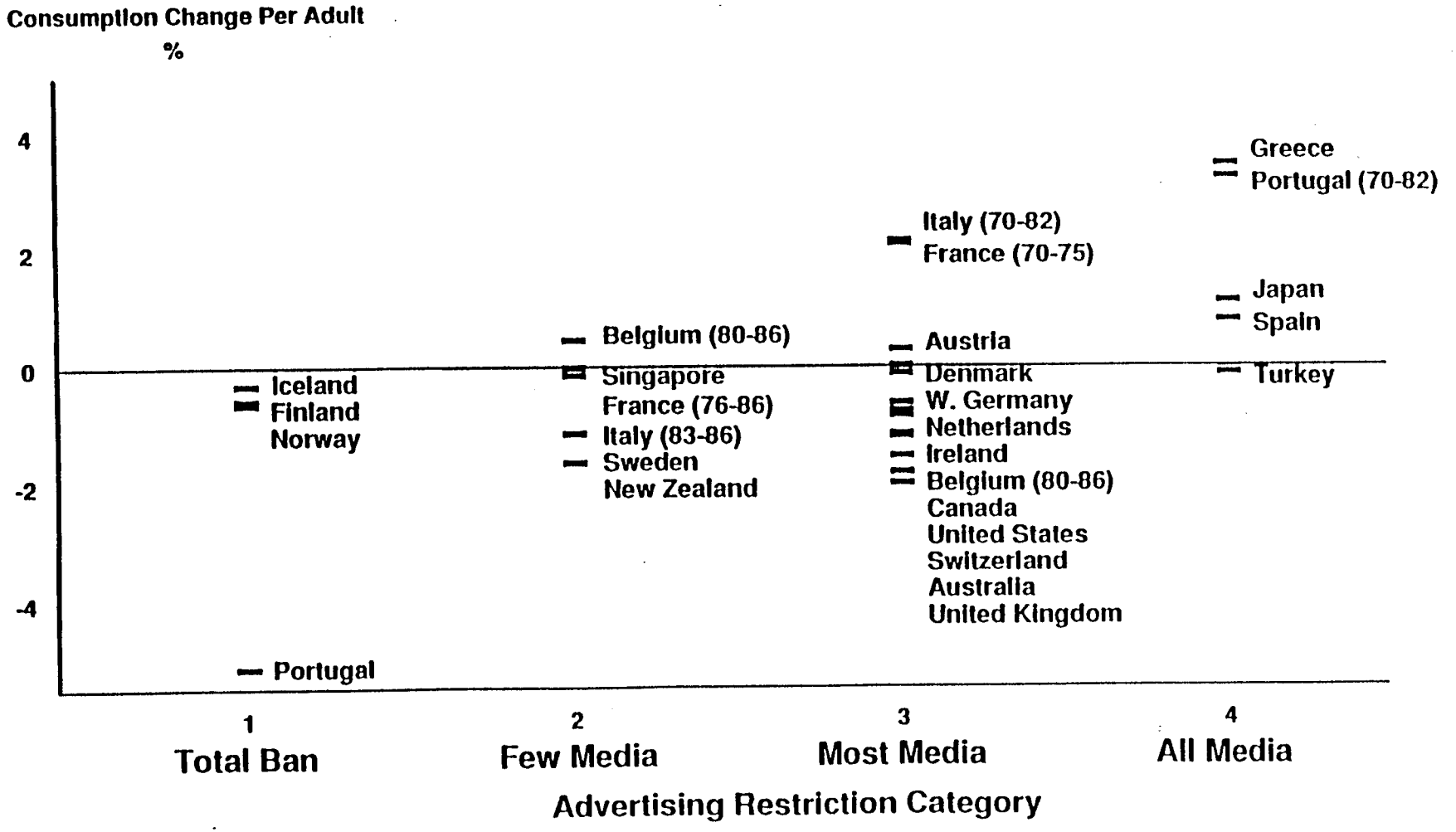
5.3 The Abnormality of the Consumption Data for Portugal in 1986

It has already been noted in Section 4.4 of this document that the TSB findings about the impact of ad bans are, in fact, reliant on the data for one country, Portugal. Table 7.5.1c of the report groups the 33 countries by advertising restriction level, as defined by the TSB, and it is clear that the other three ban countries,Iceland, Finland and Norway, appear to have suffered unremarkable consumption falls similar to those experienced in many other countries.

This is shown in Fig 5.1 , where the data of Table 7.5.1c is presented graphically for ease of interpretation (the Eastern bloc countries are excluded as they are so economically and culturally different that little meaningful analysis can be conducted with their data). The time period covered is mainly 1970-1986, unless otherwise stated. The exceptional nature of Portugal in the 1983-86 period, following the advertising ban introduced in 1983, is evident.

However, further scrutiny of the consumption data contained within the report (Appendix A Table A3.2) shows that this abnormality is caused by the very low figure for the final year alone, 1986. In 1987 consumption in Portugal rose again back to the level of 1985, according to the TSB data viz.

Fig. 5.1 INTERNATIONAL CIGARETTE TOBACCO CONSUMPTION
Annual Change % vs Ad. Restriction Category



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Portugal Consumption
(gm/adult/yr)

	1983	1985	1986	1987
	2068	1891	1750	1895
vs 1983			-15.4%	-8.4%

Source: Health or Tobacco

Therefore had the analysis for Portugal extended to 1987 the post-ban period would have seen an average annual decline of only 2.1%, compared to the 5.1% reported to 1986 in Table 7.5.1c.

This is dramatically different, and if incorporated into Table 7.5.1c would result in an average decline of -0.9% for the Total Ban Group compared to -1.6% previously. Statistically there would be no significant difference between the new consumption trend in this group and those of the other groups where restrictions apply, irrespective of the level of advertising restrictions.

Further support for the view that the 1986 'Health or Tobacco' figure for Portugal is misleading is given by other estimates of cigarette consumption over the past few years. Three different sources are shown in Fig 5.2; the Maxwell market research estimates, the figures from Tabaqueira, the Portugese monopoly, and the ERC report data. [redacted]

An economic analysis of the pattern of consumption trends across countries (see below) confirmed the abnormal nature of the 1986 data for Portugal.

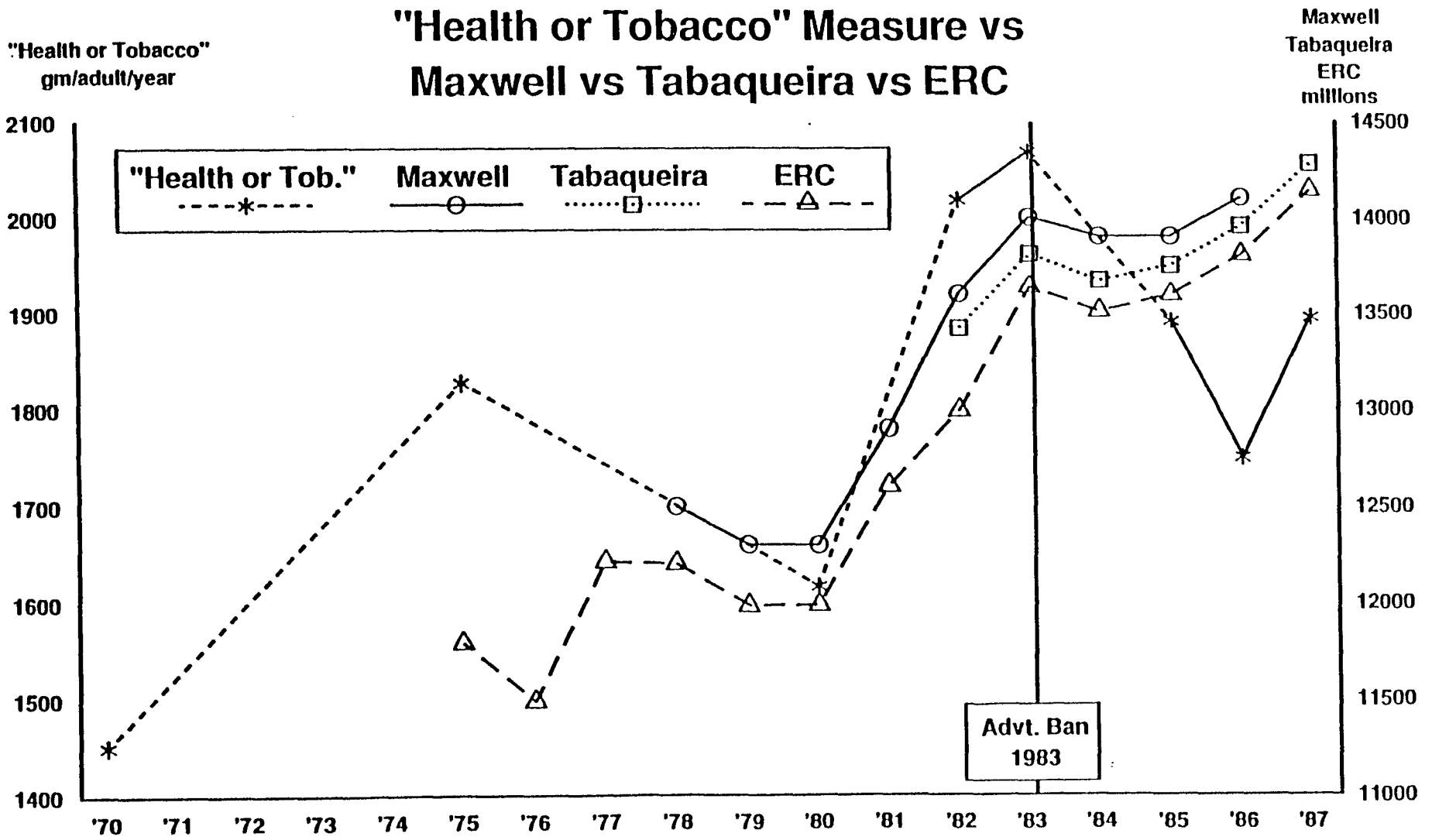
5.4 The Economic Factors and the Problem with the Income Data

As the report states both the price movements of cigarettes and the changes in consumer income are likely to be major factors in the consumption behaviour of smokers. In fact, the simple observation of consumption trends over time across different countries is inevitably limited in the extent to which it can give firm conclusions about the impact of advertising restrictions. Notwithstanding social and cultural differences, movements in the economic variables can easily mask or exacerbate any possible influence, as the TSB admit. In Table 7.5.1c, for instance, Belgium is reported as having an increase in consumption after advertising restrictions were tightened whereas it had fallen in the period when advertising was freer.

Fig. 5.2

CIGARETTE TOBACCO CONSUMPTION: PORTUGAL

"Health or Tobacco" Measure vs Maxwell vs Tabaqueira vs ERC



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Their report includes a data bank, in Appendix 3, and this was used to investigate the degree of bias the non-inclusion of economic forces may have added to the Department of Health's study.

5.4.1 The Effect of Cigarette Price

We firstly show the relationship between the consumption changes and real price changes in the Appendix Table A3.1. This data was only given for the 'western' economy countries and the 28 cases are graphed in Fig. 5.3 (24 countries with Portugal, France, Belgium and Italy having two time periods). It was not possible to indicate the names of each country, but the important ban countries are identified, together with Greece.

The overall relationship is clear from this cross-sectional analysis, as one would expect from the many studies on the price elasticity of cigarette demand. The effect of real price increases is to give lower consumption. This will therefore have a significant bearing on the statistical consumption trends observed in the TSB report, and this is investigated later.

The one main exception to the clear downward relationship indicated by the 'line of best fit' is Greece. Portugal in the 83-86 period is again seen to be exceptional, as to an extent it is in the 70-82 period.

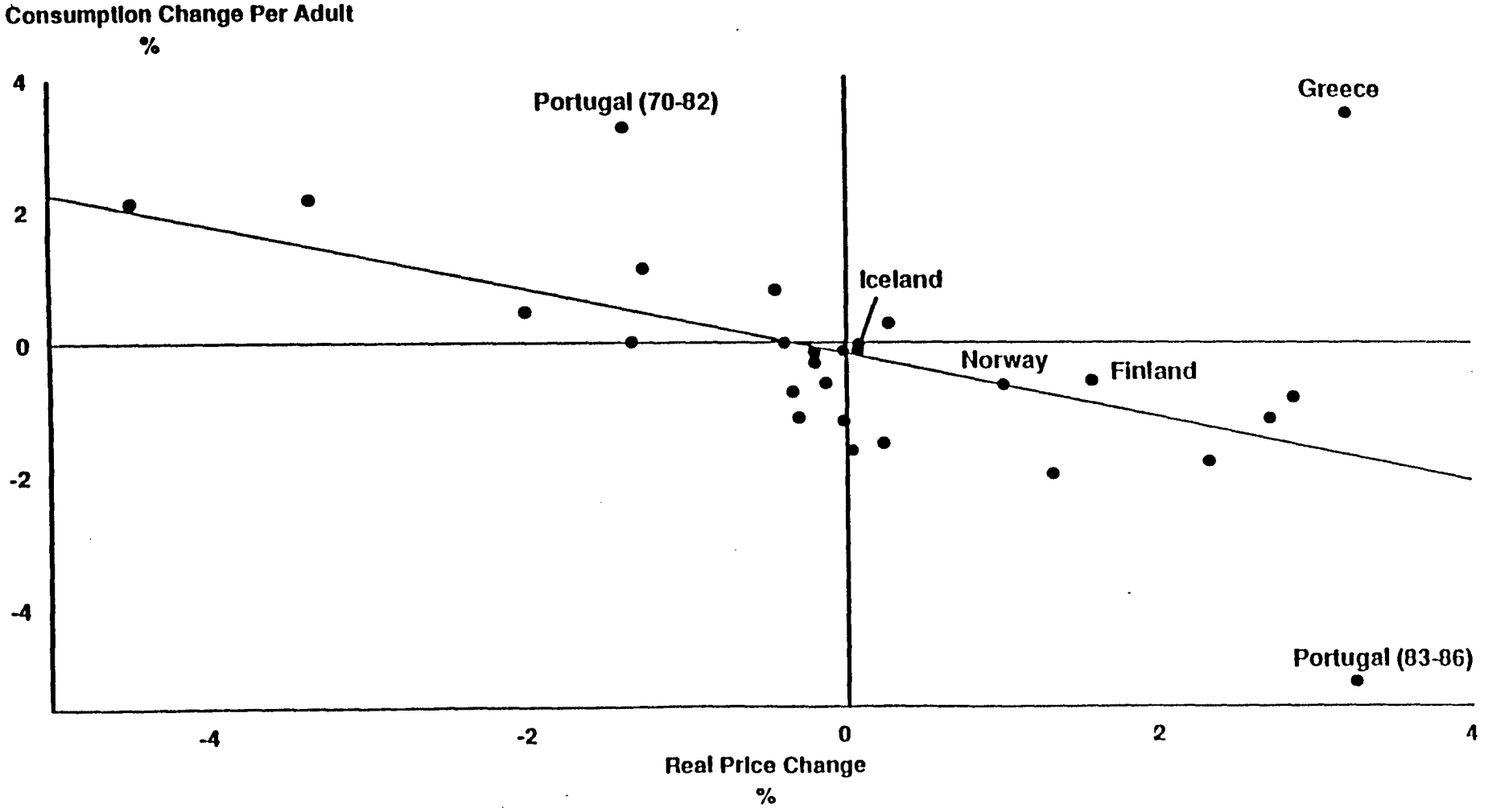
Evidence for Portugal being unusual in the 83-86 span has been given before, but it is clear that there is also a peculiarity with the Greek price/consumption relationship. It is believed that the reasons for this lie in the very low absolute price of cigarettes in that country until recently. It is understood that consumption is beginning to show signs of decline in the very latest data as some large price increases have been implemented. In any event Greece has been excluded from the detailed economic analysis presented later because of this behaviour.

The other 22 western countries appear to behave much more rationally with regard to price and a significant relationship is evident.

5.4.2 The Effect of Income and the Use of Alternative Data

The other key economic determinant is consumer income, and the report gives data for real personal income per capita, although as the footnote states this is actually retail sales per capita in most cases. The use of retail sales as a proxy for income is likely to introduce appreciable distortion to any economic analysis and may be the reason the authors failed to report any income effects. It is well known in developed countries that retail sales are not a reliable guide to personal income/consumption, as with increasing real consumer wealth expenditure is likely to be directed more into services not measured by retail sales. This can be the only reason for the considerable declines reported in Austria (70-86) and Belgium (70-79). Other studies dealing with income effects and cigarette consumption have identified a significant

Fig. 5.3 INTERNATIONAL CIGARETTE TOBACCO CONSUMPTION
Annual Change % vs Real Price Change



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positive relationship between income growth and cigarettes consumed, and many of these papers are referred to in the TSB report.

The relationship between consumption change and the TSB income change is shown in Fig 5.4, exactly as for price previously. The lack of any clear positive relationship is evident. This prompted the use of alternative data for income, and the best source was considered to be the OECD Private Consumption per capita measure. This was transformed exactly as the previous TSB data. Not surprisingly considerable discrepancies are obvious , and Austria and Belgium now have positive growth in keeping with the European economic development of the past 15 years.

The relationship between consumption change and the OECD personal income change is shown in Fig. 5.5 , where a positive trend is much more clearly evident than with the TSB data.

5.4.3 The Affordability Concept for Cigarettes

The likely significant effects of price and income led to an examination of the affordability concept for cigarettes as a means of explaining consumption trends. This was used in the TSB report on a priori grounds without any specific justification from their own data , and basically is a simple combination of price and income. They expressed it in a form that is the inverse of affordability, but we use it here in a more conventional form. It is defined here as OECD real income divided by TSB real price and expressed in % change form exactly as before. This is graphed against consumption changes in Fig. 5.6. The stronger, more defined relationship than for either price or income (OECD) separately is clear.

Obviously the economic forces have played a major part in determining consumption changes in the countries studied, and their effects are systematic and measurable. Their omission from the analysis presented in the TSB report therefore seriously undermines the validity of the findings regarding the differential impact of advertising restrictions.

The affordability idea implies that a 1% real decrease in price has the same effect as a 1% increase in real income, and vice versa, and is clearly an oversimplification of the true responses which are likely to be different. This simple examination of price and income suggested that a more rigorous investigation of the simultaneous effects of these two economic factors would be beneficial, and this is now described.

Fig. 5.4 INTERNATIONAL CIGARETTE TOBACCO CONSUMPTION
Annual Change % vs TSB Real Income Growth

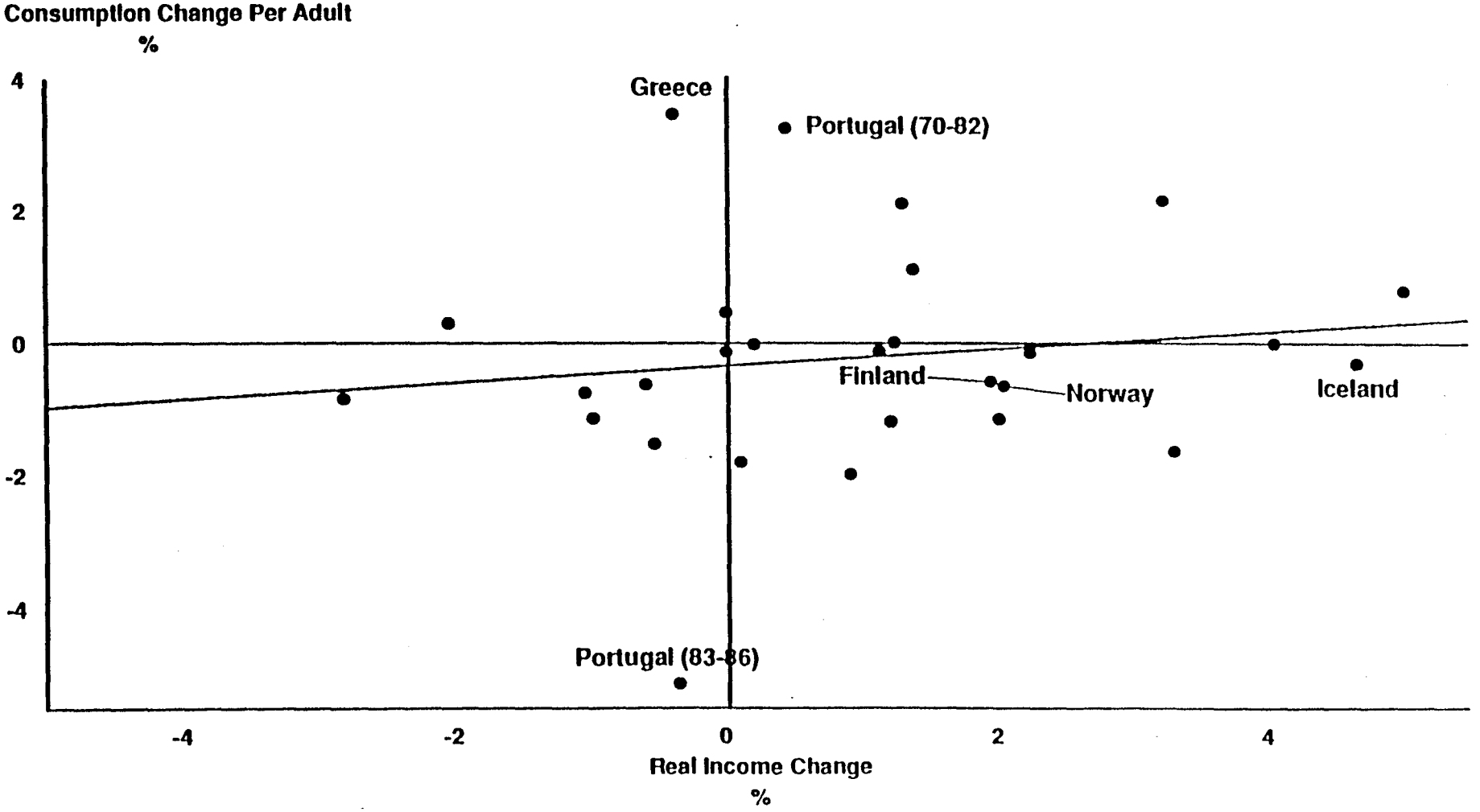

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Fig. 5.5 INTERNATIONAL CIGARETTE TOBACCO CONSUMPTION

Annual Change % vs Real Private Expenditure (OECD)

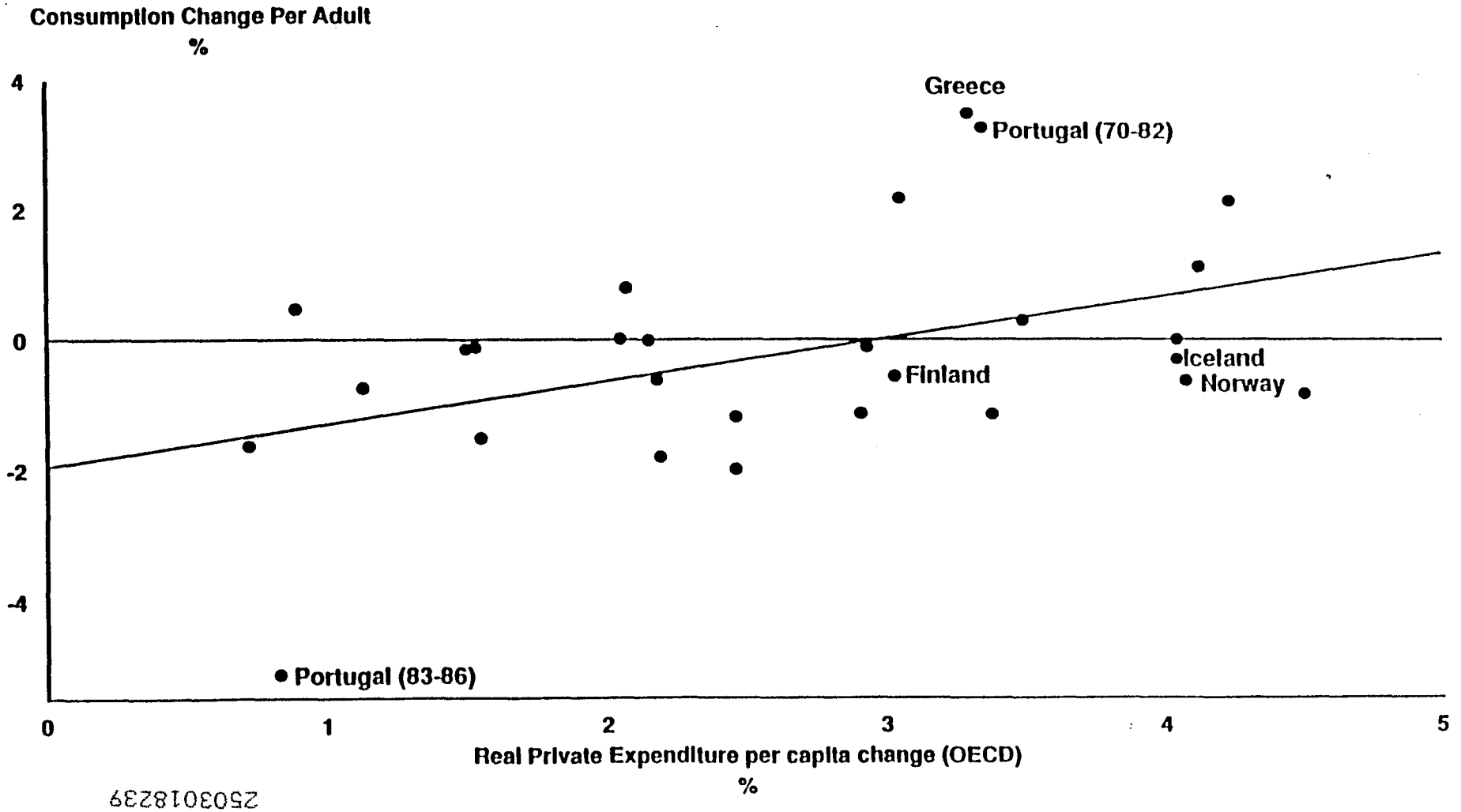

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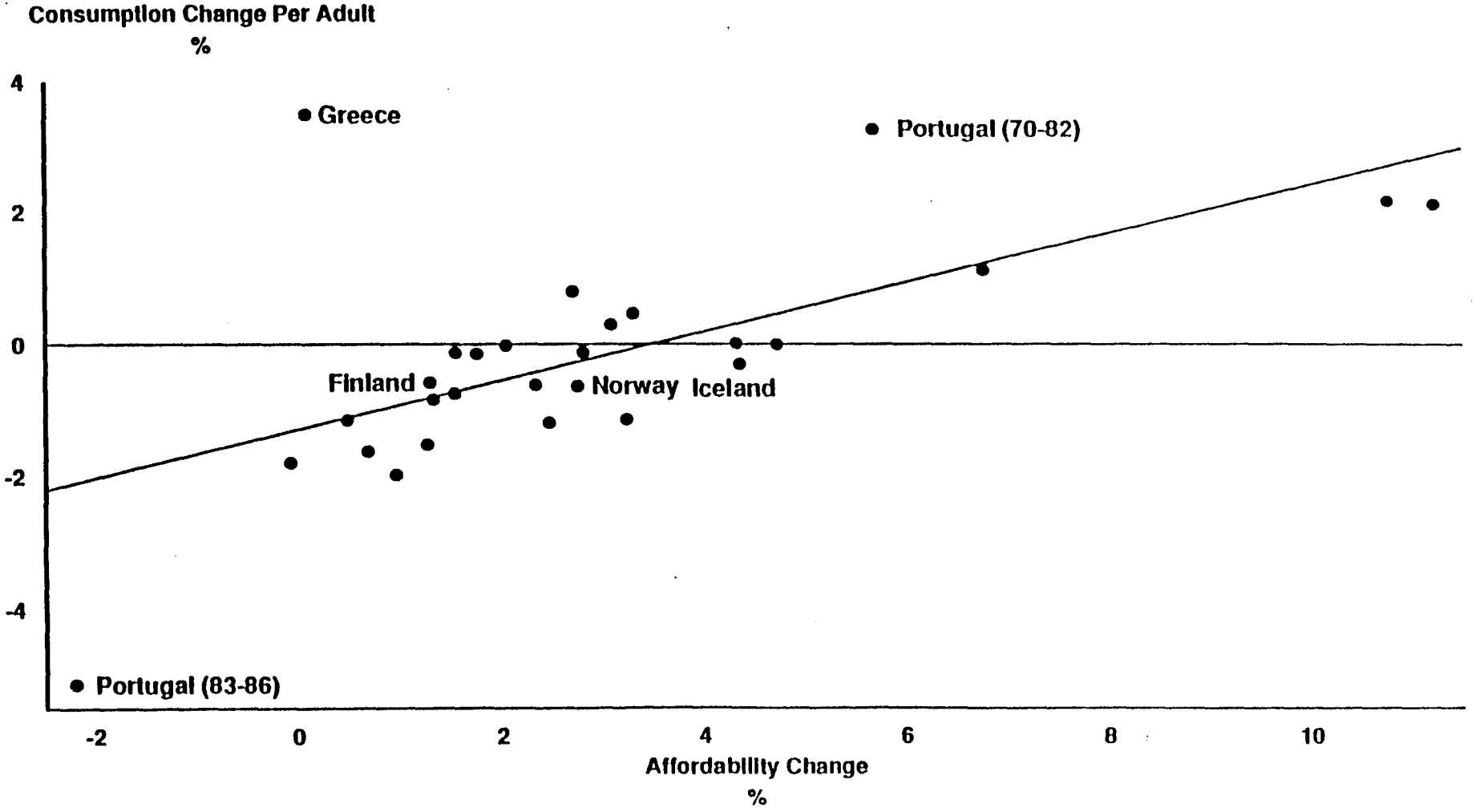
Fig. 5.6 INTERNATIONAL CIGARETTE TOBACCO CONSUMPTION
Annual Change % vs Affordability Change



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5.5 A Re-Analysis of the 'Health or Tobacco' Multi-Country Study

5.5.1 A Simple Economic Model of Cigarette Consumption

In this section a simple cross-sectional econometric model of consumption is developed to examine the extent to which the differential effects of price and income are able to explain the consumption changes in the context of the different levels of advertising restrictions. This allows us to examine directly in a rigorous statisical manner the possible impact of advertising restrictions.

For reasons indicated earlier Greece and Portugal are excluded from this analysis, which is based on the remaining 22 'western' countries.

We are seeking to explain the changes in consumption reported in the 'Health or Tobacco' study as a function of:

1) the real price change of cigarettes in the country (from the report)

2) the real income per capita change (OECD private consumption)

3) the advertising restriction classifications (from the report)

4) a possible constant (indicating an autonomous trend)

All change factors are calculated as in the TSB report and the model was linear in form in the spirit of the TSB work. The technical details of the model and the results are given in the Appendix.

5.5.2 The Modelling Results and the Implications of the Price and Income Findings

The results showed that the model was very satisfactory in terms of the statistical test criteria. The model demonstrated that the vast majority of the difference in country to country trends in consumption could be explained on pure economic grounds alone.

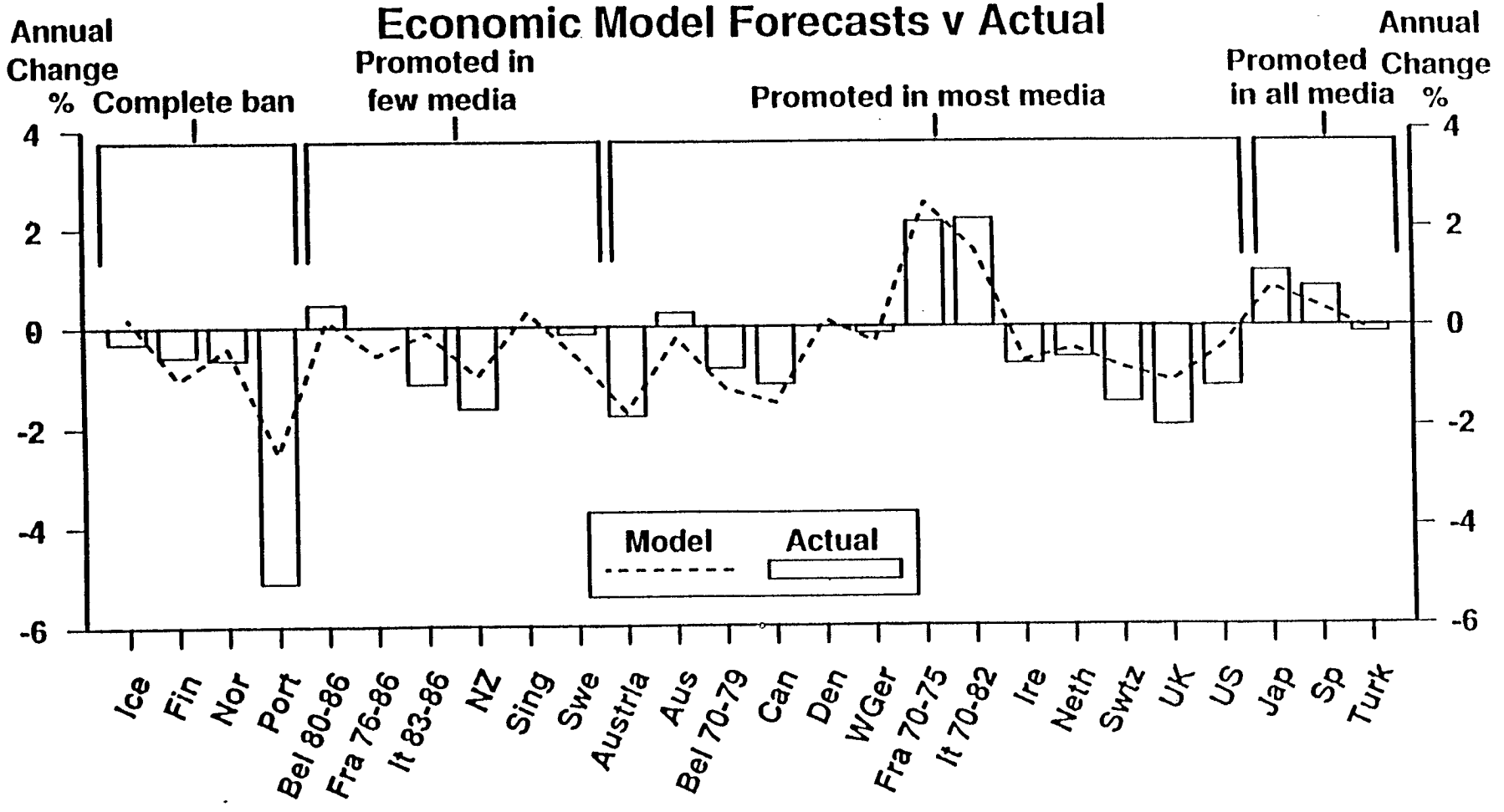
The extent to which this simple economic model was able to account for the inter-country variation is shown in Fig. 5.7. The bars represent the actual consumption change in the individual country and the broken line is the model estimate . As can be seen the actual and model are in broad agreement.

Real price was the most important determinant of cigarette consumption and income (as defined by OECD data) was also strongly significant. The estimated implied elasticities of demand are given in the table below:

Fig. 5.7

INTERNATIONAL CIGARETTE TOBACCO CONSUMPTION TRENDS

Economic Model Forecasts v Actual



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Demand Elasticities

Price	Income
-0.52	+0.32

This means that a 1% increase in real price leads to a 0.52% drop in per capita consumption, and a 1% increase in income leads to a 0.32% increase in consumption. These figures are broadly within the range of previously reported results for various countries in other papers.

The different impact of price and income implies that the affordability concept, in which both have equal effect, is clearly too simplistic an idea. This is extensively used in the 'Health or Tobacco' report, but in the light of this work it is misleading. Price changes have a much larger effect than income changes.

In the economic model in addition to these price and income influences there was a negative trend in consumption over all the countries examined of 1.3% per year on average over the time periods of the analysis. This will relate to changing attitudes to smoking and health generally across the world.

5.5.3 The Examination of the Impact of Advertising Restrictions

The potential effect of different advertising restrictions was probed extensively, but it was not possible to establish any statistically significant impact on consumption of increasing control of tobacco advertising. No firm evidence was found for the differential impact of advertising restrictions.

After allowing for the identified price and income effects there was no statistically significant difference between consumption trends in countries with a total ban, those with heavy restrictions and those with few restrictions.

The direct implication for New Zealand is clear. It already has restrictions and was included in the TSB analysis in the 'tobacco promoted in few media' category. The evidence implies that any further restrictions would have no effect, based on this further analysis of the data in the Department of Health study.

In general terms, the conclusion is that the differences in the trends of cigarette consumption in different countries are related to economic factors, not to advertising restrictions, even when there is an advertising ban.

Unfortunately it was not possible to examine the relationship between the 'advertising control score' described in the report and consumption, because very little information on the individual country scores was provided. Only averages, as in Table 7.5.2, and some other scores are shown. The score itself is a very crude indication of restrictions and the lack of weighting of the components (see Appendix

4 in the report) is an obvious error. However it is still surprising that information was not provided as it is clearly considered important by the authors of the TSB report.

However, the strong indication from the results here is that there is likely to be no significant relationship between consumption trends and the score after due allowance is made for economic considerations.

5.5.4 A Further Look at Portugal : The Forecast for the 1983-87 Period

It can also be seen that Portugal in the 83-86 period is included in Fig 5.7, with in this case a model forecast based on the relevant economic data. The forecast appears to be much lower than the actual, but as has been discussed earlier this is due to the abnormally low 1986 actual reported in 'Health or Tobacco'.

Economic data for Portugal in 1987 has been obtained and a consumption forecast has been made for the 1983-87 period using the economic model. This is compared below with the actual from the data reported in 'Health or Tobacco'.

Portugal 1983-87

	Consumption Change
Forecast (economic model)	-2.2%
Actual ('Health or Tobacco')	-2.1%

The actual and model forecast are very close over the longer and more up-to-date 1983-87 period. Clearly the economic parameters determining consumption changes in different countries are able to predict a drop in consumption in Portugal over the 1983-87 period that is very much in line with what actually occurred. No measurable effect of the advertising ban is evident.

The data for Portugal in a longer period following the ban therefore shows no ban effect. This country in the 83-86 period was the single main observation in Table 7.5.1c to show that bans have an effect. The fact that one year later, **even accepting the validity of the 1986 data**, there is no ban effect that cannot be explained by a general economic model, is further strong evidence for bans being ineffective.

5.5.5 Conclusions on the Effectiveness of Advertising Bans in Controlling Consumption

The work reported here has rigorously re-examined the data presented in the 'Health or Tobacco' report. The finding is that there is no valid statistical evidence to support the view that increasing advertising restrictions have an effect on consumption.

In the data offered as evidence in the report it has been shown that the differences between countries with a complete ban, severe restrictions or few restrictions can be explained by general social and economic factors alone. The magnitude of the price and income influences are similar to those reported elsewhere by others. No advertising restriction factor is material in explaining these consumption differences.

The one country, Portugal, to show a strong apparent impact of a ban, has been shown to have no ban effect when the period of analysis is updated and extended for one year.

Using the economic factors established above across the 22 countries, together with the 1983-87 period for Portugal, we have re-analysed the key consumption finding in the report. Firstly we re-calculated the average consumption trend for the Total Ban category (health reasons) in Table 7.5.1c and presented in the Summary of the TSB report (Figure K) as hard evidence for advertising restrictions. Secondly, we produced a forecast for this group based on the economic model. This is shown below:

Consumption Trend by Advertising Restriction

	Report (Fig K) Portugal 83-86	Report with Portugal 83-87	Economic Model Forecast (Portugal to 87)
Full Ban (exc. E.Bloc)	-1.6%	-0.9%	-0.9%

By including one further year for Portugal, to give a four year period following the ban, the average annual decline in this group almost halves to 0.9% from 1.6%. Much more importantly, in the last column it is seen that this decline is entirely predictable given the general social and economic considerations.

Thus Fig. K and the findings given in the 'Health or Tobacco' report to support a ban are misleading. **We can therefore conclude that no valid consumption evidence that an advertising ban would reduce sales in New Zealand is presented in the study.**

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Appendix 2 Per Capita Tobacco Consumption Trends in OECD Countries with and Without a Tobacco Advertising Ban

This appendix comprises four basic tables which list respectively tobacco consumption data derived from individual national sources; the World Health Organisation; Maxwell research; and the Tobacco Merchants of the US special reports.

These data are conbined into one table on page 11 of the report.

Appendix 2.1 Per Capita Tobacco Consumption Trends: National Sources

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	% Change from 1975
8	Netherlands	1748	1635	1940	1683	1908	1586	1501	1476	1372	1146	1074	1048	1031	-41 05
11	Ireland				2331	2257	2211	2119	1952	1865	1806	1759	1663	1589	-31 84
4	UK	2600	2500	2400	2600	2500	2500	2100	2100	2100	2100	2000	2000	1900	-26 92
22	Canada	2563	2605	2641	2616	2666	2679	2729	2692	2531	2456	2330	2189	2043	-20 28
27	New Zealand	2018	2000	2028	2003	1954	1906	1954	1920	1887	1914	1724	1593	1620	-19 72
9	Iceland	1402	1399	1268	1258	1275	1256	1288	1261	1274	1269	1192	1146	1132	-19 23 α
6	USA	2811	2814	2802	2767	2762	2773	2781	2727	2555	2533	2482	2416	2353	-16 30
25	Belgium - Lux	2031	1987	1949	1761	1892	1913	1935	2134	2080	2041	1918	1852	1745	-14 12
21	Australia	2301	2213	2280	2290	2352	2382	2310	2135	2089	2112	2199	2129	2024	-12 05
28	Norway	2100	2050	1995	2012	1995	2044	1980	1942	1834	1836	1841	1889	1876	-10 67 α
23	Finland	1714	1351	1389	1391	1456	1476	1378	1430	1466	1537	1387	1465	1555	-9 28 α
5	Norway	1581	1519	1573	1487	1566	1629	1553	1413	1434	1451	1515	1534	1504	-4 90 α
20	Denmark	1707	1779	1766	1750	1633	1590	1567	1714	1646	1745	1741	1701	1647	-3 52
18	Germany FR	1997	2080	1863	1979	2028	2084	2092	1815	1930	1951	1973	1924	1930	-3 34
29	France	1609	1582	1626	1591	1640	1628	1608	1615	1635	1660	1746	1708	1693	5 24
13	Turkey	1294	1344	1372	1176	1102	1144	1434	1330	1284	1296	1276	1280	1375	6 26
12	Portugal	1350	1285	1350	1340	1304	1291	1347	1378	1435	1410	1409	1420	1449	7 39 α
26	Italy	3202	3222	3240	3165	3440	3499	3573	4110	3596	3660	3687	3660	3459	8 05 α
19	Austria	1844	1905	1943	2000	2076	2055	2078	2053	2102	2059	2070	2064	2011	9 06
15	Spain	1669	1783	1861	1742	1914	1899	1734	1822	1875	1944	2064	2020	2067	23 83
14	Greece	2373	2486	2556	2645	2609	2309	2413	2624	2702	2847	2911	3009	2959	24 72
17	Norway	438	427	484	456	501	546	487	425	428	471	555	630	655	49 52 α

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Sources for appendix 2.1

4 UK Smoking Statistics, N.Wald and S. Kirkluk. Dpt. of Environmental and Preventive Mediciene, St Barthlomew's Hospital Medical College, London; S. Darby, Sir Richard Doll and M. Pike, Imperial Cancer Research Fund Cancer Epidemology and Clinical Trials Unit Oxford/TAC; R. Peto, Imperial Cancer Research Fund Cancer Studies Unit Oxford (Units grammes/person over 15)

5 Norwegian Excise Tax Directorate; Per Consumption of Manufactured Cigarettes and RYO Tobacco, Grammes per Capita.

6 US Dept. of Agriculture Year Book, Consumption in Sticks per Capita.

8 Centraal Bureau voor de Statitiek. Cigarette Consumption Sticks per Capita.

9 Jonas Ragnarsson, Icelandic Cancer Society, Reykjavik, June 30th 1988, Units Total Cigarette Consumption Sticks per Capita (See Note 5).

11 Revenue Comissionaires Annual Report. Cigarette Consumption Sticks per Capita.

12 Tabaqueira. Cigarette Consumption Sticks per Capita.

13 TEKEL, Cigarette Consumption Sticks per Capita.

14 Series Historicas de Consumo de Tabaco Elaborado (1957-88), Cigarette Consumption Sticks per Capita.

15 Greek Ministry of Finance, Cigarette Consumption Sticks per Capita.

16 Singapore Department of Statistics, Ministry of Trade and Finance, Cigarette Consumption Sticks per Capita.

17 Norwegian Tobacco Manufacturers Association, OECD Population Estimates; Sales Sticks Per Capita. (Includes border trade with Sweden from 1982).

18 Statistiche Bundestamt Wiesbaden, Finanzen und Sterun, Reihe 9.1.2. Tabakgewerbe, 1987, Cigarette Consumption Sticks per Capita.

19 Austria Tabak, Cigarette Consumption Sticks per Capita.

20 Tobaksindutrein, Cigarette Consumption Sticks per Capita.

21 Australian Tobacco Board Annual Report, Cigarette Consumption Sticks per Capita.

22 Canadian Tabacco Manufacturers' Council, Cigarette Consumption Sticks per Capita.

23 Finnish Tobacco Manufacturers' Association, Cigarette Consumption Sticks per Capita.

24 Tobacco Institute of Hong Kong Ltd, Estimate Cigarette Consumption Sticks per Capita.

25 Belgische en Luxemburges fiskale bandjes, aangekocht voor in Belgie en in Luxembourg. Units Cigarette Consumption Sticks per Capita.

26 Officio Studi Federazione Italiana Tabaccai, Units Cigarette Consumption Sticks per Capita.

27 New Zealand Customs Department, Consumption of Cigarettes Sticks per Capita.

28 Norwegian Customs & Excise Directorate, per Capita Consumption of Cigarettes and Smoking Tobacco in Grammes per Capita Over 15 (figures cover financial not calender years).

29 SEITA Cigarette Consumption Units per Sticks Capita.

Notes:

1. Countries ranked by % change since 1975.
2. Where incomplete data exists % change figures relate to available period.
3. All data in the last column is derived from the data shown in the table.
4. All population data used are from OECD Historical Statistics 1960-1987, unless otherwise stated. These data cover total population, not adult population, as in WHO statistics.
5. Where consumption data was given in units of mass, the conversion 1 cigarette = 1 gramme was used to obtain consumption in pieces
6. α Country with a ban on tobacco advertising.
7. All figures are given in sticks consumed per capita unless otherwise stated.

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Appendix 2.2 Per Capita Tobacco Consumption Trends: Maxwell Research Estimates

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	% Change from 1975
2	Netherlands	1749	1634	1941	1693	1895	1555	1495	1488	1531	1186	1083			-38 05
2	Ireland	2366	2319	2218	2293	2286	2205	2091	1925	1854	1785		1638	1581	-31 06
2	Belgium/Lux	2501	2448	2504	2423	2588	2595	2633		2143	2015	1897	1818	1768	-29 33
2	UK	2359	2324	2241	2229	2211	2158	1956	1811	1802	1761	1743	1682	1669	-29 26
2	Canada	2512	2636	2653	2660	2688	2680	2729	2695	2532	2468	2339	2183	2051	-18 38
2	Finland	1719	1354	1393	1389	1448	1485	1375	1429	1462	1536	1387	1464	1561	-9 18 α
2	Sweden	1428	1459	1382	1414	1411	1432	1382	1453	1393	1379	1341	1338	1322	-7 47
2	Iceland							1926	1778	1844	1863	1805	1770	1800	6 56 α
2	Germany FR	2004	2080	1888	1984	2014	2063	2104	1760	1851	1924	1952	1922	1923	-4 03
2	Switzerland	2420	2416	2517	2432	2362			2474	2515	2490	2418	2404	2402	-0 75
2	Denmark	1403	1478	1454	1430	1446	1405	1386	1524	1427	1506	1525	1465	1404	0 02
2	Portugal				1373	1339	1324	1378	1442	1473	1451	1441	1451		5 71 α
2	Italy	1600	1610	1620	1582	1720	1750	1786	1794	1799	1830	1843	1774	1727	7 93 α
2	France	1558	1535	1577	1546	1640	1568	1576	1586	1606	1632	1717	1686	1692	8 58
2	Austria	1847	1903	1942	1997	2080	2053	2075	2047	2052	2065	2064	2062	2007	8 63
2	Spain	1643	1761	1837	1725	1896	1884	1701	1810	1864	1935	2052	2015		22 64
2	Greece	2089	2182	2245	2322	2294	2271	2415	2625	2701	2848	2909	3010	2961	41 70
2	Norway		422	495	468	491	538	488	437	436	459	554	624	645	52 83 α

Sources: 2 Maxwell Research Estimates (Cigarette Consumption per Capita).

Notes:
1. Countries ranked by % change since 1975.
2. Where incomplete data exists % change figures relate to available period.
3. All data in the last column is derived from the data shown in the table.
4. All population data used are from OECD Historical Statistics 1960-1987, unless otherwise stated. These data cover total population not adult population as in WHO statistics
5. Where consumption data was given in units of mass, the conversion 1 cigarette = 1 gramme was used to obtain consumption in pieces.
6. α Country with a ban on tobacco advertising.
7. All figures are given in sticks consumed per capita unless otherwise stated.

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Appendix 2.3 Per Capita Tobacco Consumption Trends: Tobacco Merchants of the USA Inc. Estimates

		1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	% Change from 1975
10	UK	3286	3191	3009	2906	2862	2716	2411	2170	2064	2028	1950	1885	1827	44 42
10	Netherlands	1748	1635	1940	1683	1908	1624	1487	1546	1358	1160	1074	1092	1041	40 45
10	Belgium/Lux	2031	1987	1950	1761	1892	1913	1935	2088	1723	1538	1611	1386	1280	36 99
10	Canada	2586	2686	2708	2661	2727	2680	2729	2743	2578	2462	2343	2178	2072	19 85
10	USA				2759	2727	2725	2773	2641	2545	2523	2486	2413	2366	14 27
10	Finland	1719		1388	1391	1360	1356	1384	1717	1466	1536	1469	1468	1559	9 32 α
10	Japan	2633	2435	2669	1749	2684	2661	2604	2640	2606	2594	2560	2541	2415	8 25
10	Australia		2127	2354	2298	2274	2232	2298	2252	2234	2208	2070	1992	2066	2 86
10	Germany FR	2041	2098	1891	2011	2054	2085	2112	1855	1917	2005	2021	1994	2028	0 65
10	Sweden	1425	1458	1376	1417	1441	1431	1380	1449	1447	1462	1356	1418	1430	0 38
10	Switzerland	2419	2419	2518	2431	2368	2409	2440	2473	2548	2520	2521	2414	2499	3 32
10	Italy	1601	1611	1620	1583	1720	1749	1787	1879	1908	1861	1978	1839	1716	7 18 α
10	Ireland		1642	1620	1647	1996	2205	2105	1925	2012	1852	1808	1771		7 84
10	Austria	1845	1905	1943	2000	2076	2055	2078	2053	2142	2046	2141	2048	1995	8 15
10	France	1560	1536	1579	1545	1599	1590	1582	1585	1636	1659	1744	1708	1694	8 58
10	Portugal	1380	1316	1376	1467	1348	1339	1381	1412	1492	1434	1431	1406	1531	10 95 α
10	Spain	1751	1920	1994	1884	2024	2046	1907	1844	1692	1973	2023	1987	2081	18 83
10	Denmark	1324	1400		1450	1427	1374	1386	1524	1646	1730	1725	1668	1628	22 96
10	Greece	2380	2485	2255	2660	2636	2641	2724	2623	2621	2766	2826	2900	2952	24 01
10	Norway								425	426		567	627		47 59 α

Sources: 10 Tobacco Merchants of the US Inc. Special Reports Nos. SR88-2; SR87-2; SR 84-3 Cigarette Consumption per Capita.

Notes:
1. Countries ranked by % change since 1975.
2. Where incomplete data exists % change figures relate to available period
3. All data in the last column is derived from the data shown in the table.
4. All population data used are from OECD Historical Statistics 1960-1987, unless otherwise stated. These data cover total population not adult population as in the WHO statistics.
5. Where consumption data was given in units of mass, the conversion 1 cigarette = 1 gramme was used to obtain consumption in pieces
6. α Country with a ban on tobacco advertising.
7. All figures are given in sticks consumed per capita unless otherwise stated.

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Appendix 2.4 Per Capita Tobacco Consumption Trends: WHO Estimates

	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	% Change from 1975
Netherlands	3060	2770	3060	2430	3010	2730	2050	2020	2160	1560	1690			-44 77
UK	3210	2970	2950	3020	2840	2750	2470	2270	2180	2180	2120			-33 96
Ireland	3490	3240	3110	2940	2910	2890	2750	2870	2870	2630	2560			-26 65
Belgium - Lux		2380	2260	1990	2130	2230	2080	2390	2140	1910	1990			-16 39
Sweden	1860	2030	1770	1790	1920	1950	1770	1790	1780	1790	1660			-10 75
Germany FR	2660	2650	2330	2500	2530	2610	2540	2200	2280	2350	2380			-10 53
Finland	1880	1540	1640		1890	1840	1870	1780	1820	1910	1720			-8 51 α
Norway	760	730	770	730	810	850	700	700	540	580	710			-6 58 α
Denmark	2210	2320	2270	2240	2080	1970	2070	2030	2050	2100	2110			-4 52
Portugal	1800	1660	1750	1760	1840	1780	1800	1800	1870	1730	1730			-3 89 α
Switzerland		3050	3300	3170	3620	3680	2710	3190	3120	2880	2960			-2 95
Iceland	3020	2820	2850	3130	3220	3240	3240	3200	3160	3130	3100			2 65 α
Austria	2350	2500	2600	2670	2700	2670	2550	2680	2650	2510	2560			8 94
France	2170	2150	2060	2130	2170	2080	2050	2050	2070	2090	2400			10 60
Italy	2120	2180	2170	2090	2250	2320	2180	2390	2410	2370	2460			16 04 α
Greece	3130	3250	3350	3480	3470	3420	3590	3370	3340	3500	3640			16 29
Spain	2110	1600	1900	1800	2030	2320	2360	2460	2260	2620	2740			29 86

Sources: 1 World Health Organisation Estimates (Consumption of Manufactured Cigarettes per Adult).

Notes:
1. Countries ranked by % change since 1975.
2. Where incomplete data exists % change figures relate to available period.
3. All data in the last column is derived from the data shown in the table.
4. Where consumption data was given in units of mass, the conversion 1 cigarette = 1 gramme was used to obtain consumption in pieces
5. WHO data is defined as consumption of manufactured cigarettes per adult, and uses a different population base from the OECD statitics used elsewhere in the report.
6. α Country with a ban on tobacco advertising.
7. All figures are given in sticks consumed per capita unless otherwise stated.

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Appendix 4 Filter Cigarette Penetration Model

Table 7.5.3 of the TSB report illustrates vividly the fact that the average increase in the percentage of filter cigarettes smoked has been highest over the 1971/86 period in countries where tobacco advertising has been allowed. The exception to this rule is shown as those countries with a ban on advertising for political reasons (in other words the Eastern Bloc Countries).

However, the authors of the TSB report have made no allowance for the fact that fast growth rates in any market becomes more and more difficult to achieve as the base level of market share rises. In other words, it is easier to achieve a 50% growth rate when market share is 2% than when it is 20%. And it becomes impossible to achieve a large growth rate when market share is at high levels such as the 80%-98% range which filter cigarette penetration has achieved in so many Western countries.

For example, consider the increases in the following two hypothetical cases:-

Country 1 has 50% filter market penetration in 1970 and hence the maximum possible average annual increase to 1980 is

$$100 \times (100-50)/(50 \times 10) = 10\%$$

Country 2 has 90% filter market penetration in 1970 and hence its maximum possible average annual increase to 1980 is

$$100 \times (100-90)/(90 \times 10) = 1.1\%$$

The existence of this effect is clearly seen if the 'Annual increase %' column in Table 7.5.3 is plotted against the 'Percentage filter-tip 1971' column. (attached)

If we let the values in the 'Annual increase' column be Y and those in the 'Percentage filter-tip 1971' column be X, then the statistic $b = Y/(100-X)/X$ is a measure of how well each country has performed after removing the above effect.

Alternatively, the slope (b) of the line

$$Y = b\,(100-X)/X$$

gives the same information; the steeper the slope the more the country has achieved after correcting for the market penetration effect.

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The parameter estimates were as below, with t statistics in brackets:

P = -0.51 (7.08)

I = +0.33 (2.93)

LI = -0.02 (0.05)

L2 = 0.0008 (0.003)

L4 = +0.77 (2.14)

T = 1.32 (3.79)

The overall model diagnostics were:

R squared = 0.79

F (5,19) = 14.1

Clearly the L1 and L2 factors are not statistically significant. The L4 factor is just significant, but this category represents only 3 cases. The non-significant factors were dropped in the final estimate of the elasticities and the Portugal forecast.

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